

Grasses of the Pacific slope, including Alaska and the adjacent islands. pt. 1.¹ roy, 8°. pp. (50) pl. 50. Washington, 1892. (U. S. Dept. of Agric.—Bot. Div. Bull. 13.)

Report of the botanist². (In U. S. Dept. of Agric. Rep. of the Sec'y for 1891. pp. 341-358. Washington, 1892.)

Wilmington, Del. and Washington, D. C.

Frost freaks of the dittany.

BY LESTER F. WARD.

WITH PLATE XIX.

One bright, crisp, frosty morning (Dec. 5, 1892), as I was taking a delightful ramble with my congenial friend Mr. Victor Mason and following the pleasant road that leads from the little Virginia village of Accotink toward the tomb of Washington, some white objects looking like icicles close to the ground on our right along the border of a pine wood arrested our attention. After remarking a number without stopping to inspect them they presently grew so numerous and exhibited such a uniformity that the scientific instinct could no longer be restrained and we turned aside to satisfy our curiosity.

We found that they were in truth nothing but ice, but that instead of icicles they were veritable freaks of frost. Every one was firmly attached to the stem of a small herbaceous plant which had succumbed to the season but still stood erect. The attachment was always close to the base, often at the very ground, sometimes an inch above. At a distance the frost-works had the appearance of cylindrical masses, but one need not come very near to see that such was not the case. In fact they really consisted of several thin foils or wings from one to three inches in width, firmly attached by one edge to the stem of the plant, thus standing in a vertical position. From this attachment each of these little ice sheets projected out horizontally or with a slight upward tendency, not straight and stiff, but gently and gracefully curving or coiling into a beautiful conch-like roll at the distal margin. There were always several of these, usually three, four, or five, all attached

¹Part 2 of this work will be issued June 1, 1893.—J. N. R.

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to the same vertical portion of the stem but at regular intervals around it like the paddles of a flutter-wheel, but all curving in the same direction after the manner of a turbine wheel. Thus, where there were four they stood with each pair opposite, as in the accompanying cuts, of which fig. 1 represents a cross-section and fig. 2 a side view. The amount of curving varied considerably, and the coil sometimes filled up most of the interval between the plates giving the object a compact appearance. The ice was white, opaque, and singularly light, as if consisting of congealed froth, but in all cases the scrolls bore horizontal stripes like those of a flag, resulting from degrees in the whiteness, varying from alabaster to nearly transparent. These stripes added greatly to the beauty of these singular objects. In some cases the inner margin, instead of being straight was sinuous (fig. 3), giving a fluted character to the base of the wing (fig. 4). Many other peculiarities were noted in these evanescent toys, as holding them in our hands we walked along discussing and admiring them; but as they soon vanished and memory is treacherous, I refrain from further details.

But what propriety is there in publishing this purely physical phenomenon in a botanical journal? Just here is the chief wonder. There grew in the same situation some dozen or twenty small herbaceous plants of about the same general character which would all seem equally liable to exhibit such a phenomenon. There were species of *Aster*, *Solidago*, *Chrysopsis*, *Pycnanthemum*, *Polygonum*, *Ludwigia*, *Sericocarpus*, etc., etc., and with these in considerable but not specially marked abundance, *Cunila Mariana*. The first frost-works seen were attached to this plant, which we supposed for a while to be an accident; but soon we perceived that such was not the case, and an examination of hundreds of cases revealed the fact that they were exclusively confined to this species. No sign or semblance of them could be found on any other plant. They were, therefore, so far as our observation went, a specific character, and it is this alone which has prompted me to give the above account in the hope that others might be able to confirm or invalidate this induction by a wider one.

This plant, at least in this latitude, persists after frost with all its branches, sear leaves, and empty seed-vessels intact, so that its identity is as complete as it was in midsummer. The bark, which remained firm everywhere else was seen to be

longitudinally split into strips at the zone occupied by the frost-work, but as it could be seen between the several ice sheets, these rifts must have been covered by their bases. In other words, it cannot be doubted that the liquid matter out of which they were formed had passed through these longitudinal openings and been deposited by molecular accretions in the symmetrical forms observed. We inferred from this that they might consist entirely of the juices of the plant, and made the only chemical test in our power, namely, that of placing them on the tongue. The result was wholly negative, as nothing distinguishable from pure distilled water could be detected. As the upper part of the stems was dead and dry and the roots perennial, the conclusion was that the water had by some agency been pressed or drawn up through the cambium layer of the roots from the soil and forced out through these apertures in the bark. The action of frost in the ground might account for the required pressure, and the whole would be thus explainable on physical principles. But it explains too much, since no reason can be assigned why the phenomenon should not be universal and not confined to a single species.

Since making these observations I have been to some pains to ascertain whether any one else has witnessed this phenomenon and thus far have found no record. It is possible that this is the first time that *Cunila Mariana* has been discovered to be a frost-weed. At the time the discovery was made it had quite escaped my memory that *Helianthemum Canadense* behaves in a similar way. That plant is not common in this region and I have not yet had an opportunity to observe it at the proper season. The statement in the first edition of Gray's Manual, 1848, where the name "frost-weed" is given to this species, that "late in autumn crystals of ice shoot from the cracked bark at the root, whence the popular name," repeated in all subsequent editions and copied into many other books, is doubtless founded on earlier recorded observations, but is not found in Nuttall or Pursh. My attention was called to it by Prof. J. C. Arthur, who also referred me to a figure in Mr. Wm. Hamilton Gibson's recent book entitled "Sharp Eyes."¹ This figure is somewhat fanciful, being a vignette constituting the first letter of this chapter of his book and aiming to show all the parts of the

¹New York, 1892. Article "The Frost Flower," pp. 210-211.

plant in addition to the frost work. Although it is, according to this representation, a much less definite and less beautiful object than our dittany "frost flowers," there can be no doubt that the principle on which it was formed is the same. The author's description of it as "fashioned into all sorts of whimsical feathery curls and flanges and ridges" indicates at once the inadequacy of his figure to do it justice and the close analogy between it and the "frost flower" of *Cunila*.

We shall probably soon hear of other plants that have a similar habit.

U. S. National Museum.

EXPLANATION OF PLATE XIX.

Fig. 1. Cross-section of a four-winged frost-work, generalized. Fig. 2. Side view of same, showing mode and position of attachment to stem. Fig. 3. Illustration of sinuous margin of some of the foils. Fig. 4. Side view of same, showing fluted or gathered appearance.

BRIEFER ARTICLES.

On two new or imperfectly known Myxomycetes.—WITH PLATE XX.—
Comatricha caespitosa n. sp. Pl. xx, figs. 1-4.—Sporangia densely crowded or caespitose, rising from a delicate hypothallus. Individual sporangia very shortly stipitate or sessile, clavate, 1-1.5^{mm} high. Sporangial wall grey, iridescent with blue tints, comparatively permanent but finally disappearing. Columella rising to two-thirds or three-fourths of the height of the sporangium, and giving rise throughout its length to the dense, blackish capillitium. Main branches of the capillitium thick at the point of origin, frequently anastomosing and becoming gradually thinner toward the surface of the sporangium; tips pointed, free, not attached to the wall of the sporangium, and forming no peripheral network. Spores globose, distinctly asperate, 9.6-12.8 μ in diameter, pale brownish-violet by transmitted light, blackish-violet in the mass.

On moss, and lichens of the genus *Cladonia*, Wood's Holl, Mass., August, 1892, *W. A. Setchell*.

This interesting species is characterized by its densely caespitose habit, more or less permanent sporangial wall, and large, asperate spores. The individual columellas sometimes exhibit marked variations from the type, variations which might be taken to indicate abnormal developments. On the whole, however, the principal characteristics of this *Comatricha* seem to be of definite specific value, if we